

RALPH H. TWEDDELL'S
SYSTEM OF
HIGH-PRESSURE HYDRAULIC MACHINERY
APPLIED TO
SPECIAL MACHINE TOOLS

For RIVETTING, PUNCHING, SHEARING, FLANGING, and BENDING PURPOSES.

ALSO

PORTABLE HYDRAULIC RIVETTING MACHINES,
FOR BRIDGE, GIRDER, AND SHIP WORK.

DESIGNS, ESTIMATES, AND WORKING DRAWINGS

PREPARED FOR

Hydraulic Machinery for Warehousing Grain and Goods.

In bulk or otherwise ; also for application to

DOCK GATES, CRANES, COAL TIPS, TRAVERSERS,
AND FOR
STEERING SHIPS, WORKING TURRETS, GUNS, &c., &c.

Speaking on this system, an able and well-known writer in 'Engineering,' January 26th, 1873, says :

"To obtain the *full* benefit of such a system of working machine tools as that of which we have just been speaking, it would be necessary, of course, that it should be carried out on a *large scale*, but its employment in *even a less complete form* would, we believe, be attended with advantage. Ample experience has now been had with hydraulic machinery, and there need be no fear of its want of reliability or doubt of its being possible, to work it with economy, and just as we now find those who are employing hydraulic cranes and similar machinery convinced of the advantage of the system and unwilling to return to any older plan, so we believe that ultimately we shall find our large workshops *supplied principally with tools worked by hydraulic power*, to the displacement of shafting, belting, and their accompanying complications."

Spens' 'Dictionary of Engineering,' Vol. III., p. 2347, contains also an able and fully descriptive article from one of their contributors on Tweddell's system.

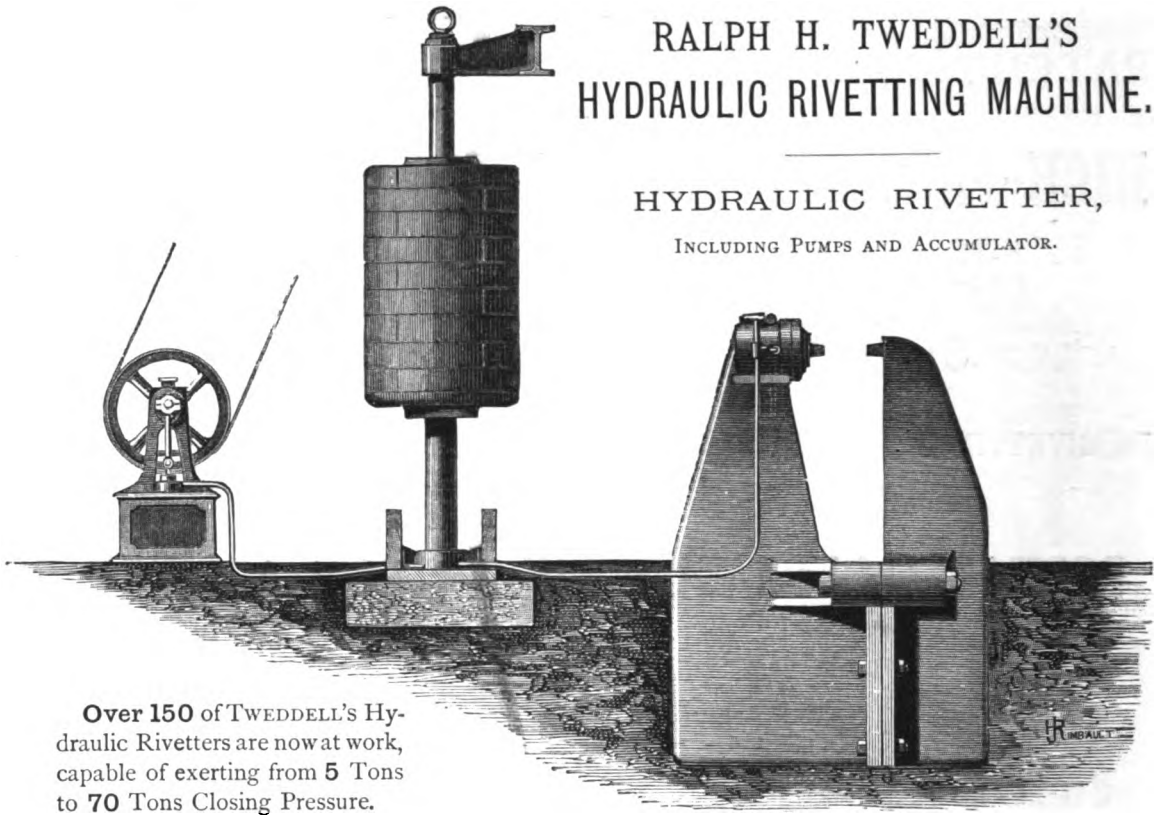
See following pages for some of its applications.

For Prices and Particulars apply to

RALPH H. TWEDDELL,
14, DELAHAY STREET, WESTMINSTER, LONDON, S.W.

RALPH H. TWEDDELL'S HYDRAULIC RIVETTING MACHINE.

HYDRAULIC RIVETTER,
INCLUDING PUMPS AND ACCUMULATOR.



Over 150 of TWEDDELL'S Hydraulic Rivetters are now at work, capable of exerting from 5 Tons to 70 Tons Closing Pressure.

Class.	Dead Closing Pressure on Rivet Head, exclusive of Blow.		Depth of Gap.	Price Complete, including Double Pumps and Accumulator	
	Tons.	ft. in.		£	
A	25	4 6	...	330	
A ²	25	4 6	...	360	
B	25	5 0	...	350	
B ²	25	5 0	...	400	
C	25	6 0	...	400	
D	40	4 6	...	440	
F	40	5 0	...	470	

Class.	Dead Closing Pressure on Rivet Head, exclusive of Blow.		Depth of Gap.	Price Complete, including Double Pumps and Accumulator.	
	Tons.	ft. in.		£	
K	40	5 6	...	500	
G	30	5 0	...	430	
G ²	30	5 0	...	470	
H	30	10 0	...	740	
L	50	6 7	...	685	
M	40	6 7	...	625	

And any other proportions desired.

OBSERVE.—These Prices include Accumulator and Pumps. The Rivetter requires no foundations, and the Pipes only cost about 1s. 6d. per foot run.

A², B², G², have Wrought-Iron Holders-up, and can take in small Tubes and Rivet small Fire-boxes.

These Machines can have the pressure on the Rivet readily reduced by means of the Accumulator Weights.

In these Machines, owing to the special proportions of the Accumulator, the *greatest* pressure is exerted on the Rivet only at the *end* of the stroke, when it is *most* required. Only *one* valve is required for the *whole* apparatus, and everything is above ground and get-atable.

TWEDDELL'S system surpasses all others, either steam, geared, or otherwise, by its combining a dead closing pressure and a sharp blow when bringing the plates together and closing the Rivets. For some of the users, see page 540.

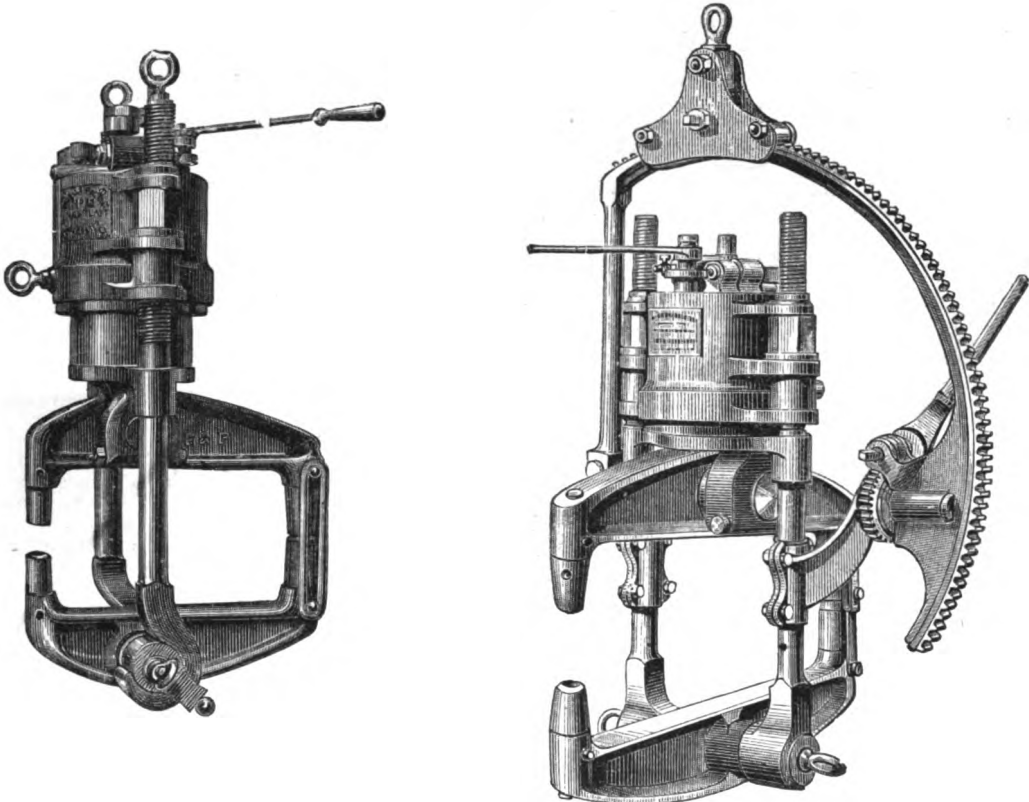
N.B.—Existing Steam and other Rivetting Machines can at a very small expense be converted to the above system. The Inventor will be glad to refer intending purchasers to several Firms who have done this.

For all Prices and Particulars apply to

RALPH H. TWEDDELL,
14, DELAHAY STREET, WESTMINSTER, LONDON, S.W.

RALPH H. TWEDDELL'S PATENT PORTABLE HYDRAULIC RIVETTER,

FOR RIVETTING UP BRIDGES, GIRDERS, SHIPS' FRAMES, KEELSONS, BOILER FLUE RINGS
AND ENDS, GUN CARRIAGES, WHEEL TYRES, WAGON FRAMES, &c., &c.



These Machines can close from 200 to 300 rivets, 1 in. to 1½ in. diameter, per hour, and are especially adapted for all work, such as girders, ships' frames, &c., where great depth of gap is not required. They can be fitted as Punching Machines also, and when the levers are removed, they make very powerful Machines for this purpose. They are made to do the above work at 1500 lb. per square inch; they will, however, do very good work at 700 lb., using a size larger. The levers can be had of any proportions required. These Machines are also made stationary up to any power, and a very compact arrangement on a wall bracket is designed for rivetting Boiler Flue Rings.

In each of the above proportionately smaller Rivets can be closed at *twice* the distance from the edge by reversing the end of lever used. These prices include a new patent adjustable suspending gear, swivel joint to couple to pipes, and several important improvements.

The patent quadrant suspending gear, £30 extra, enables all curved and irregular shapes to be done without aid from extra men to adjust the Machine. If supplied on the Machine *at first*, £20 extra only.

PRICES.

Class.	Diameter of Cylinder.	Closes.	Gap.	Price.
A	6 in.	½-in. rivets	6 in. from edge	£115
B	8	1	8	£145
C	9	1½	13	£165
D	10	1½	13	£185

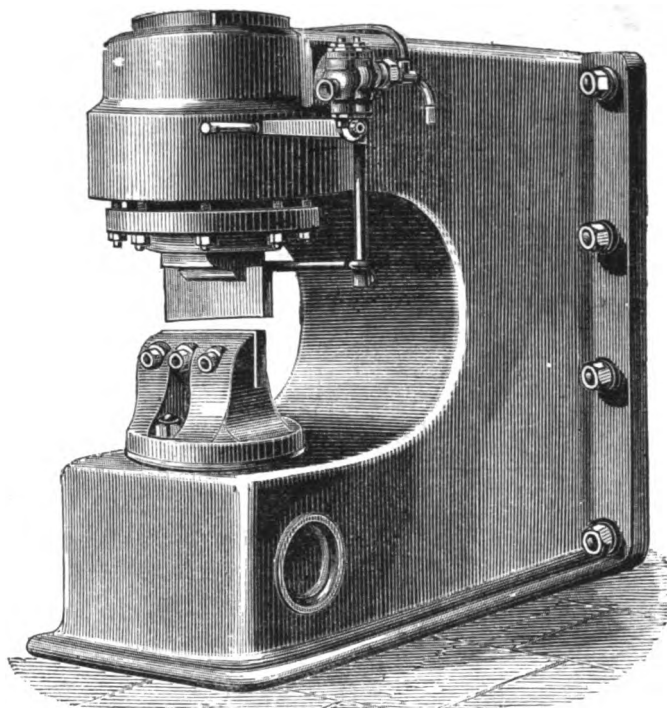
Special Copper Pipes are supplied at 2s. 6d. per foot, and Hydraulic Couplings at 25s. each.

ACCUMULATOR AND PUMPS additional, from £190 and upwards, according to number and sizes of Machines to be worked by them.

FOR LISTS OF SOME OF THE USERS, SEE FOLLOWING PAGE.

For further Particulars and Information apply to
RALPH H. TWEDDELL,
14, DELAHAY STREET, WESTMINSTER, LONDON, S.W.

RALPH H. TWEDDELL'S HYDRAULIC PUNCHING AND SHEARING MACHINES.



The above Woodcut represents the shearing end of a Machine for Punching and Shearing. These Machines have been made up to 5' 0" gap, to punch $1\frac{1}{2}$ " holes in $1\frac{1}{2}$ " plates, and to shear a length of 17" of $1\frac{1}{2}$ " plate in one cut. A number of such have been supplied to the French Government.

Perfect simplicity, no gearing, shafting, or belts required. **Equal speed** in working to that obtained by geared Machines.

Impossibility of breakage, however large the iron put under Knife or Punch, since the pressure on Rams due to the Accumulator cannot be exceeded.

The Punch, Shears, and Angle Cutters are, even in the combined Machines, independent of each other, and can be disconnected and placed separately in any convenient position if desired, and thus in the event of any one end of the Machine being stopped from any accident, the others are not affected.

Perfect accuracy in Punching is attained by the man having to move the starting lever before the Punch can descend, and **no stop** is required to prevent the Punch coming down too soon.

When not actually doing work, no wear and tear of Machine going on, as is the case when belting and shafting have to be kept running.

Distance from the motive power is no disadvantage. **Perfect silence**, and **no vibration**, and **no foundations** required.

By removing the Blocks either end of the Machine can be converted into a Rivetting or Stamping or Forging Press, and the Shearing Machine Knives can be altered to any angle relative to centre line of tool, for cutting very long bars, &c.

The Valve Gear is arranged so that the Stroke, and consequently the amount of water-power used, can be regulated to suit different thicknesses of plate.

These Machines will be found especially convenient for use in Smithies, Forges, &c., when situated at a distance from the available motive power.

Full Lists of users of the above, and also of Tweddell's Fixed and Portable Hydraulic Rivetters, can be obtained on application to the Patentee as below. A few, however, of these under each head are appended :

FIXED RIVETTER.

English Government, Portsmouth and Keyham.
 French Government, Toulon.
 German Government, Wilhelmshaven.
 John Penn and Sons, London.
 Maudslay, Sons, and Field, London.
 John Elder and Co., Glasgow.
 Schneider and Co., Creusot.
 Thompson and Co., Newcastle.
 Laird Bros., Birkenhead.
 Palmer and Co., Jarrow. (10 ft. gap.)
 Marshalls, Sons, and Co., Gainsboro'.
 Robey and Co., Lincoln.
 Baltic Engineering Co., St. Petersburg.
 F. Krupp, Essen.
 And 100 others.

PORTABLE RIVETTER.

H. M. Indian Government, Indian State Railways.
 Sir W. G. Armstrong and Co., Elswick.
 F. W. Webb, Esq., L. and N. W. Ry., Crewe.
 John Fowler and Co., Leeds.
 Fielding and Platt, Gloucester.
 Henry Chapman, 11, Rue Louis-le-Grand, Paris.
 William Sellers and Co., Philadelphia, U.S.A.
 R. Daglish and Co., St. Helens.
 Jos. Clayton, Preston.
 H. Y. Horsfield, Dewsbury.
 Gloucester Wagon Co., Gloucester.
 Stevenson Engine Co., Oldham.
 Cail and Cie, Paris.
 &c. &c.

PUNCHING, SHEARING, AND FLANGING MACHINES.

River Wear Commissioners, Test Works.
 River Tyne Commissioners, Test Works.
 Lloyd's Chain Test, Chester.
 Aveling and Porter, Rochester.
 French Government, Toulon. These new works are *entirely* fitted up on Tweddell's Hydraulic System, having engine pumping power up to 50 horse.
 Hydraulic Engineering Co., Chester.
 Marshalls, Sons, and Co., Gainsboro'.
 John Fowler and Co., Leeds.
 Gustave Piedboeuf, Aix-la-Chapelle.
 &c. &c.

For Particulars of the Hydraulic Cranes, Lifts, &c., as supplied to Docks, Railways, Grain and other Warehouses, apply to

RALPH H. TWEDDELL,
 14, DELAHAY STREET, WESTMINSTER, LONDON, S.W.